## AMENDMENTS TO THE CLAIMS

**Listing of Claims**

The following listing of claims replaces all prior versions and listings of claims in the application.

1. (Currently amended): Semiconductor base structure for molecular electronics and molecular electronics-based biosensor applications, ~~characterized by~~ comprising a patterned semiconductor heterostructure surface forming the source, drain and gate contacts to build up hybrid electronic devices from this semiconductor base structure and one or more conductive organic ~~„wires"~~ wires.

2. (Currently amended): Semiconductor base structure according to claim 1, ~~characterized in that~~ wherein the organic ~~„wires"~~ wires are organic molecules with conjugated π-electron system, DNA oligonucleotides or car-bon nanotubes.

3.(Currently amended): Semiconductor base structure according to claim 1, ~~or 2,~~ ~~characterized in that~~ wherein the one or more organic wires of this hybrid system are further functionalized with receptors for biomolecular recognition or receptors made of biomolecules which recognize bioactive molecules like hormones, polysaccharides, lipids, or drugs such that the device can be employed as highly sensitive electrical biosensor for the detection, analysis and quantification of specific biomolecules and their mutual interaction.

4. (Currently amended): Semiconductor base structure according to claim 3, ~~characterized in that~~ wherein the receptors for biomolecular recognition are antibodies or proteins.

5. (Currently amended): Semiconductor base structure according to ~~one of the claims 1 to 4, characterized by~~ claim 1, wherein a semiconductor heterostructure which consists of a material stack of two thick ~~(typically 50nm – 1µm)~~ undoped layers of material [[„A"]] A separated by an extremely thin ~~(typically 1nm – 20nm)~~ doped layer of different thin semiconductor material [[„B"]] B or of different composition in case of compound semiconductors, with conductive source and drain electrodes on top of material [[„A"]] A which are separated only by a very short, groove-like ~~„nano-gap" (Figure 2A)~~ nano-gap.

6. (Currently amended): Semiconductor base structure as in claim 5, ~~characterized in that~~ wherein the thin, selectively etched layer fulfils the function of a field effect gate electrode when operating the hybrid electronic device as a molecular electronics or biosensing device.

7. (Currently amended): Semiconductor base structure as in ~~claims 1 to 5, characterized in that~~ claim1, wherein the wires may consist of molecules of length fitting or exceeding the gap and being terminated and chemical endgroups able to covalently bind to the metal electrodes.

8. (Currently amended): Semiconductor base structure as in claim 3, ~~characterized in that~~ wherein a selective binding of a bio-molecular analyte to the organic nanowire changes the

receptor's electron affinity towards the wire thus modifying its delocalized electron distribution and in turn leads to a change in molecular conductance.

9. (Currently amended): Semiconductor base structure as in ~~one of the claims 5 or 6, characterized in that~~ claim 5, wherein the heterostructure material stack comprises undoped AlGaAs for the thick layers and doped GaAs for the thin middle layer.

10. (Currently amended): Semiconductor base structure as in ~~one of the claims 5 or 6, characterized in that~~ claim 5, wherein the deposited metal is an alloy of Pd and Au.

11. (Currently amended): A method of producing a semiconductor base structure according to claim 5, ~~characterized in that~~ wherein the material stack being cleaved perpendicular to the layer planes and the obtained cleavage plane being subsequently selectively etched such that only the central thin layer [[„B"]] B is removed deep into the cleavage plane and a thin ~~(typically 1nm – 20nm)~~ metal layer being deposited on the etched cleavage plane from an angle ~~(Figure 1B)~~ to form the conductive source and drain electrodes.

12. (Currently amended): A method for producing a semiconductor base structure according to claim 11, ~~characterized in that~~ wherein the described cleavage is performed twice along different preferably perpendicular crystal directions and that two metal layers are being deposited sequentially from different angular directions in such way that a region of minimal electrodes distance forms exactly and only at the corner of the two cleavage claims.

13. (Currently amended): A method for producing a semiconductor base structure according to ~~claims 11 or 12, characterized in that~~ claim 11, wherein the semiconductor heterostructure is epitaxially grown by molecular beam epitaxy (MBE).

14. (Currently amended): A method for producing a semiconductor base structure for molecular electronics and molecular electronics-based biosensor applications ~~of claim 7~~ according to ~~one of the claims 11 to 13, characterized in that~~ claim 11, wherein the wire are being deposited by self-assembly techniques from solution or solid source evaporation in ultra-high vacuum, said semiconductor base structure comprising a patterned semiconductor heterostructure surface forming the source, drain and gate contacts to build up hybrid electronic devices from this semiconductor base structure and one or more conductive organic wires, in that the wires may consist of molecules of length fitting or exceeding the gap and being terminated and chemical endgroups able to covalently bend to the metal electrodes.